CHRONIC OBSTRUCTION OF THE ANTRUM OF THE STOMACH BY A MUCOSAL DIAPHRAGM, WITH MALNUTRITION, IMPAIRMENT OF GROWTH AND SECONDARY SMALL INTESTINE DAMAGE

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SOMETIMES the antrum of the stomach is almost occluded by a thin mucosal membrane or diaphragm stretched across the lumen. A central aperture, often very small, allows slow imperfect emptying of the upper loculus (which comprises most of the stomach) into the distal antrum, and into the duodenum. If nutrition is maintained at all, the level at which it is maintained depends on the size of the central aperture. There is no ulceration and no other abnormality, and as a rule no cause for the presence of the membrane is evident. The lesion is not related to the concentric contraction and canalising of the antrum seen in chronic simple ulceration of the antrum, nor is it related to cryptogenic hypertrophy of the antral muscle. It is not a pre-malignant lesion. It has to be distinguished from mucosal diaphragm at or in the pyloric (gastroduodenal) channel (Rhind 1959). That also produces chronic obstruction, but it shows a different appearance on barium X-ray plates.

Ewald (1892) described a lesion in the neighbourhood of the "pylorus" as a possible cause of dilatation of the stomach. "Sometimes a regular ring is found, so that when the stomach is opened it looks as if a cord had been drawn underneath the mucous membrane". Riegel (1897) described a "mucosal duplication" as a cause of "pyloric" stenosis and ectasia of the stomach. Probably these were antral mucosal diaphragms. More recently antral mucosal diaphragm has often been reported (Sames, 1949; Parrish *et al.*, 1966; Banks *et al.*, 1967; Parrish *et al.*, 1968) and discussed (Smith and Tuttle, 1969), but needs to be better known.

Case Report

The patient was a girl, born in 1948, who first complained at the age of 12, and first attended a hospital at age 16. She complained at that time of a tight feeling in the abdomen, of eructations of offensive gas, and of mild diarrhoea. Nothing remarkable was found on physical examination. She was not acutely or severely ill. Her weight was 94 pounds. E.S.R. 3 mm. in one hour. Haemoglobin was 80 per cent. Mean cell haemoglobin concentration 31 per cent. A barium meal showed an abnormality in the distal antrum (Fig. 1), enlargement of the stomach proximal to the antral lesion (Fig. 2), and a residue of barium at 4 hours. The X-ray appearances were those of antral mucosal diaphragm.

At age 17 she came to the Royal Victoria Hospital complaining mainly of skin bruising, but also of tightness in the abdomen, swelling of the abdomen, regurgitation of offensive gas, and of diarrhoea. She was small and anaemic. Her weight was 88 pounds. Height was 59.5 inches. Haemoglobin 75 per cent. Red cell count

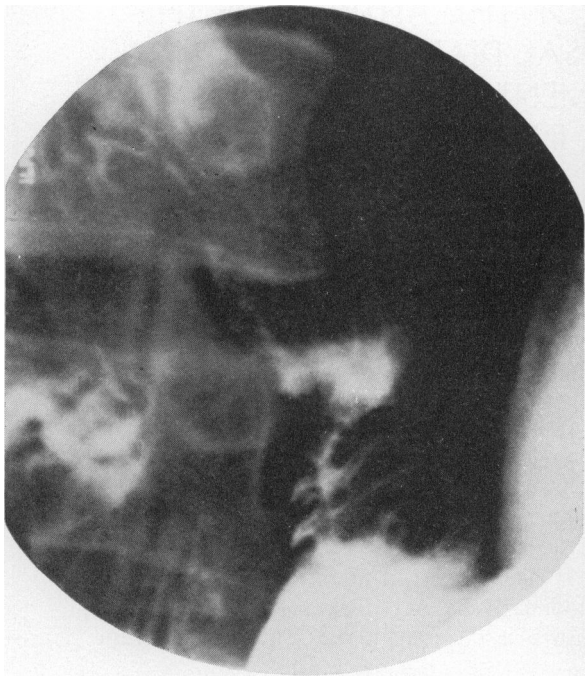

FIG. 1. *The antral diaphragm in* 1964. *There is a thin, narrow, regular, transverse filling defect in the antrum. There is a coating of barium on the distal face of the membrane, and incomplete filling of the base of the duodenal cap.*

FIG. 2. 1964. *The large stomach proximal to the antral lesion. Normal duodenal cap.*

3.8 millions. Mean cell volume 96 cubic microns. Mean cell haemoglobin concentration 30 per cent. Serum iron 34 micrograms per cent. Blood pressure 110/70. A gruel fractional test meal showed almost no free acid. Serum B_{12} 385 micromicrograms per ml. Serum folic acid 5.1 millimicrograms per ml. A barium meal X-ray showed appearances similar to those of 1964. There was some dilatation of the ileal loops of the small intestine (Fig. 3). Because the lesion was unfamiliar and her symptoms were not acute, laparotomy was deferred. The anaemia made some improvement for a short time after the administration of iron.

She was re-admitted at age 20. She was not eating well. Nutrition and growth were poor. The anaemia was worse. The haemoglobin was 7.5 grams per cent and the mean cell haemoglobin concentration 31 per cent. She had begun to take aspirin because she thought that it diminished the offensive eructations. The bowels were moving five or six times a day. Blood urea 19 mgm. per cent. The faecal fat was not increased. Blood group A, Rh positive. The antral lesion was as before (Fig. 4) and there was a small lesser curvature simple ulcer crater (Fig. 5) which was presumed to be due to aspirin damage.

At operation the stomach was found to be large and the muscle hypertrophied. The duodenum and small intestine appeared normal. When the stomach was

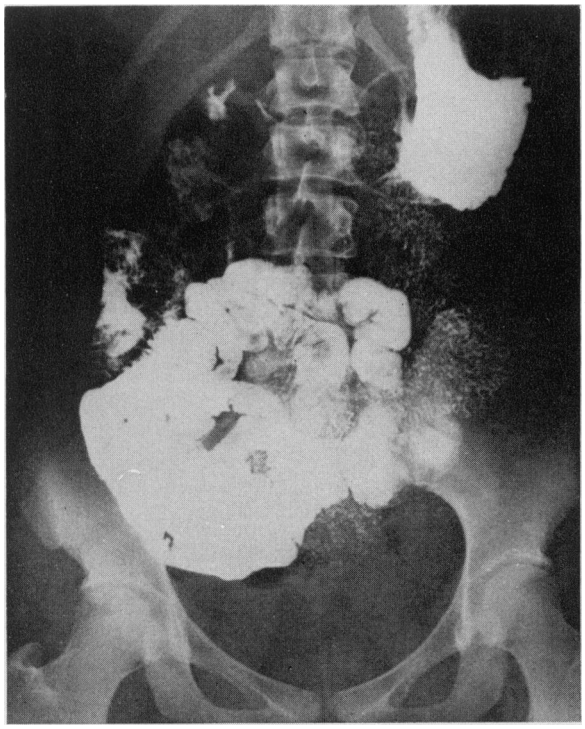

FIG. 3. 1967. *The dilated ileal loops. Normal jejunal pattern.*

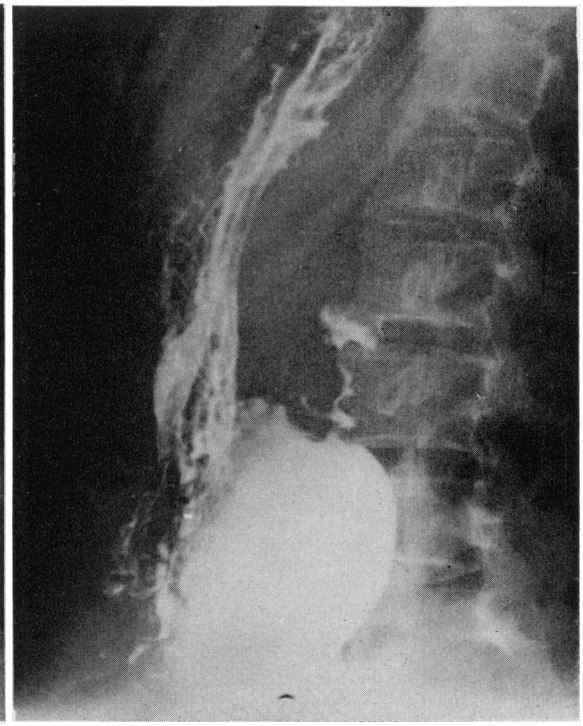

FIG. 4. 1969. *Prone view, showing the antral lesion unchanged since* 1964.

opened in its long axis, there could be seen in the antrum about 2 centimetres from the duodenum, a mucosal diaphragm with a very small opening (Fig. 6). The diaphragm was removed and pyloroplasty done.

A year later there was no longer any regurgitation of gas, nor any feeling of distension, nor any diarrhoea. She was no longer anaemic. She felt well, was working, and was shortly to be married. However, she was still not a good eater. Her weight which had risen to 96 pounds had fallen again to 88 pounds. The haemoglobin was 13.1 grams. Red cell count 4.5 millions. Serum B_{12} 690 micromicrograms per ml. Serum folic acid 12 millimicrograms per ml. Two years later a barium meal showed no delay in gastric emptying, and the appearance of the ileal loops was normal. An aortic diastolic murmur could now be heard. There were no cardiac symptoms or disability. The haemoglobin was 12.4 grams. Weight was 95 pounds. There was no increase in height. It was disappointing that there was not more improvement in muscle bulk, and in general strength and in subcutaneous fat. Perhaps increase in height was not to be hoped for in a girl of 20 in whom the menarche had occurred at $13\frac{1}{2}$.

COMMENT

The obstructing web-like diaphragm must have been present from her early

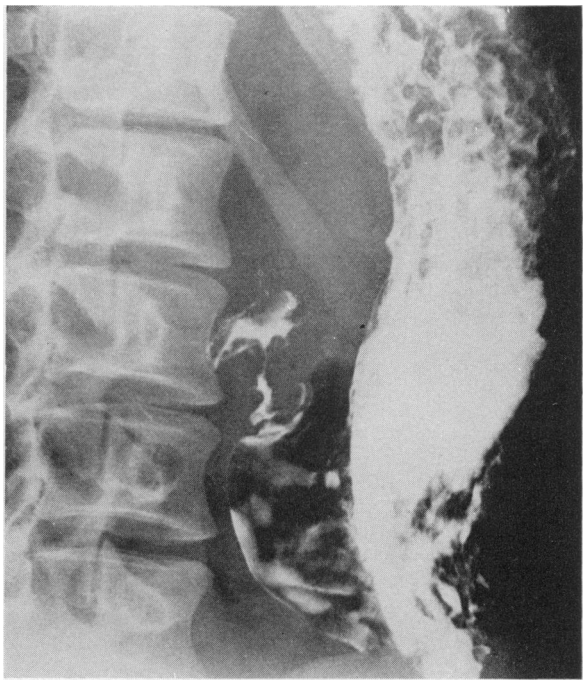

FIG. 5. 1969. *The antral lesion is shown, and a small lesser curvature simple ulcer crater.*

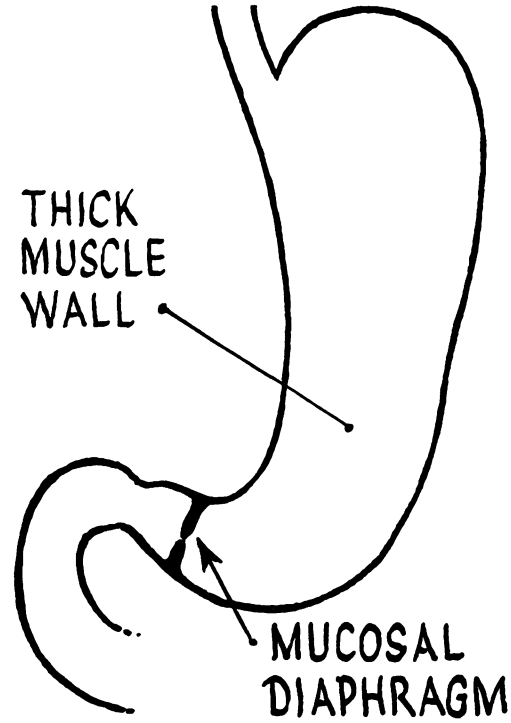

FIG. 6. 1969. *A diagram of the operative finding.*

years, and have caused her to be a poor eater, to have malnutrition, and to grow poorly. It does not seem that the poor eating, the impaired growth and frail physique are going to be corrected, in spite of the removal of the obstruction.

Diarrhoea is common in chronic incomplete gastric retention of any kind. It may indeed temporarily be worse just after the obstruction is relieved by operation. It is generally ascribed to small intestine mucosal damage by the abnormal population of bacteria growing in the residue in the obstructed stomach, or by their products. That may be an incomplete explanation. Possibly some of the small intestine mucosal damage is malnutritional (Logan, 1971).

Maturation in this patient was not hindered so much as growth, because menstruation began at 13½ and was regular. After the operation the menstrual loss was heavier than before. It was interesting that the patient did not have any personality changes resembling those of anorexia nervosa. Indeed she was a happy, sensible young person.

A barium examination of the alimentary tract is essential in investigating chronic anorexia or failure to thrive in young women. The thin, narrow, regular, transverse filling defect in the antrum, with the well-filled stomach proximally, and the slow incomplete filling distally, is diagnostic of antral mucosal diaphragm. The lesion itself is static and not progressive, though the stomach proximally may

distend, and, if there is secondary change in the small intestine, the small intestine pattern may become disordered.

The advantage of opening the antrum and inspecting the lesion is that blind antrectomy for a lesion of unidentified nature is avoided, and the least procedure necessary for correction of the obstruction can be decided.

When a considerable retention is present in the stomach at 4 or 6 hours, it is dangerous to ascribe it to "spasm" in the distal stomach or to "gastric ileus". It must be very doubtful, to say the least, if "pylorospasm" exists. Every such suggestion should be examined critically, for fear that a true obstructive lesion may be present. Though the lesions are not the same as antral mucosal diaphragm, it is worth mentioning that a minute fibrotic contracture or a small mucosal web in the pyloric (gastroduodenal) channel are the hardest to detect (Rhind, 1959). When the stomach is normal (including the antrum), and the duodenal cap is normal, and there is gastric retention, the presence of a web or a scar in the gastro-duodenal channel between the two should be considered.

Being an obstructing mucosal web, antral mucosal diaphragm resembles Plummer-Vinson stricture of the cervical oesophagus, hour-glass stricture of the stomach, and duodenal web (Logan, 1966). Web-like strictures are occasionally seen in the rectum in ulcerative colitis. In the present state of knowledge no cause common to these lesions and antral mucosal diaphragm can be discerned, though in this case the iron deficiency and anaemia were notable.

The present confusing nomenclature makes it difficult to know what is meant in the literature by "pylorus" and "pyloric". These words should be abandoned. The antrum of the stomach is that part of the stomach between the incisura or angulus on the lesser curvature and the opening, on the gastric side, of the channel leading from the antrum to the first part of the duodenum. This channel should be called the gastro-duodenal channel. We should not speak of antral lesions being "prepyloric" or juxtapyloric", but say they are in the distal antrum. We may also describe lesions as being in the proximal or mid antrum. Instead of saying "pyloric" obstruction, we should specify antral, or duodenal, or gastro-duodenal channel obstruction.

Summary

Chronic obstruction of the gastric antrum by a mucosal diaphragm is described. It caused malnutrition and impairment of growth through the patient's second decade. Secondary small intestine damage was an important feature. The X-ray appearances are diagnostic and should allow early diagnosis. If operation is delayed, spurt in growth and adequate improvement in nutrition may not be obtained, even if total correction of the obstruction is achieved.

Acknowledgements

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